

ABSTRACT

Induced movement in a patient is detected and correlated with a TMS stimulating pulse so as to determine the patient's motor threshold stimulation level. Direct visual or audible feedback is provided to the operator indicating that a valid stimulation has occurred so that the operator may adjust the stimulation accordingly. A search algorithm may be used to direct a convergence to the motor threshold stimulation level with or without operator intervention. A motion detector is used or, alternatively, the motion detector is replaced with a direct motor evoked potential (MEP) measurement device that measures induced neurological voltage and correlates the measured neurological change to the TMS stimulus. Other signals indicative of motor threshold may be detected and correlated to the TMS stimulus pulses. For example, left/right asymmetry changes in a narrow subset of EEG leads placed on the forehead of the patient or fast autonomic responses, such as skin conductivity, modulation of respiration, reflex responses, and the like, may be detected. The appropriate stimulation level for TMS studies are also determined using techniques other than motor cortex motor threshold methods. For example, a localized ultrasound probe may be used to determine the depth of cortical tissue at the treatment site. When considered along with neuronal excitability, the stimulation level for treatment may be determined. Alternatively, a localized impedance probe or coil and detection circuit whose Q factor changes with tissue loading may be used to detect cortical depth.